UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/683,927	10/10/2003	Niraj Mahadev	2855/98	2230

7590 04/08/2008

KENYON & KENYON
Suite 700
1500 K. Street, N.W.
Washington, DC 20005

EXAMINER	
CULBERT, ROBERTS P	

ART UNIT	PAPER NUMBER
1792	

MAIL DATE	DELIVERY MODE
04/08/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/683,927
Filing Date: October 10, 2003
Appellant(s): MAHADEV ET AL.

Sumit Bhattacharya
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 9/18/07 appealing from the Office action mailed 11/16/06.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

3,291,738	SCIAMBI	12-1996
4,037,367	KRUSE	07-1997
4,821,461	HOLMSTRAND	04-1989
5,509,556	BALZ ET AL.	04-1996
5,897,424	EVANS ET AL.	04-1999

Kohler, Michael; "Etching in Microsystem Technology" pp. 1-3; 1999, Wiley VCH.

Walker, John R.; "Machining Fundamentals" Chapter 28, pp. 511-515; 2000, Goodheart-Wilcox.

Wolf et al. "Silicon Processing for the VLSI Era" Vol. 1, pp.407-409 and 529-530; 1986, Lattice Press.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 5,897,424 to Evans.

Regarding Claim 1, Evans et al. teach selectively etching (Col. 3, Lines 57-59) a metal lapping plate (Col. 3, Lines 34-46) and imbedding diamond particles into the metal plate. (Col. 1, Lines 10-40) (Col. 4, Lines 4-6) and (Col. 6, Lines 1-5).

Claim Rejections - 35 USC § 103

Claims 2-4 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,897,424 to Evans et al. in view of "Etching in Microsystem Technology" to M. Köhler pp. 1-3, and "Machining Fundamentals" to J. Walker pp. 511-516.

Regarding Claim 2, Evans et al. teaches that it is known that a metal lapping plate may be machined or etched (Col. 3, Lines 57-59) to form texture or pattern that provides for the retention of polishing media or the accumulation of material removed from the surface. (Col. 2, Lines 55-63) Regarding the limitation of imbedding diamond particles, Evans et al. teaches that it is known to use abrasive particles in a slurry provided at the interface of the lapping plate and/or to imbed abrasive particles in the substrate surface (Col. 1, Lines 10-40 and Col. 4, Lines 4-6) Evans et al. further teaches suitable polishing abrasives include diamond and silicon carbide (Col. 6, Lines 1-5)

Regarding Claim 2, Evans et al. does not expressly teach etching the pattern by applying a photoresist to the metal plate, selectively exposing areas of the resist to electromagnetic radiation, developing the photoresist, and etching areas of the metal. However the recited steps are notoriously old and well known in the etching art for the purpose of selectively etching a fine pattern in a semiconductor or metal layer. For example, Köhler teaches that the use of photoresist patterning is old and well known in the art of etching selective patterns in metals. (See last paragraph page 2.) Walker teaches that a metal plate may be selectively etched by coating a photosensitive resist layer (photoresist) exposing to electromagnetic radiation through a mask, developing the resist, etching exposed portions of the metal plate and removing the photoresist.

It would have been obvious to one of ordinary skill in the art at the time of invention to selectively apply a photoresist to the metal plate of Evans et al. in order to selectively protect portions of the metal layer from etchant exposure thereby forming a pattern or texture.

Regarding Claim 3, Evans et al. teach embedding particles in non-etched areas of the metal plate. (Col. 4, Lines 4-6) Further, it would have been obvious to one of ordinary skill in the art at the time of invention to provide abrasives on the non-etched areas, since the non-etched areas are raised, and thus contact the substrate.

Regarding Claims 4 and 12, Walker teaches providing a mask (negative) between electromagnetic radiation source and photoresist layer. (chemical blanking Step 3 on page 515)

Claims 5 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,897,424 to Evans et al. in view of "Etching in Microsystem Technology" to M. Köhler pp. 1-3, and "Machining Fundamentals" to J. Walker pp. 511-516, and in further view of view of Applicant's Admitted Prior Art (APA), U.S. Patent 4,037,367 to Kruse and U.S. Patent 5,509,556 to Balz et al.

Regarding Claims 5 and 13, Evans et al. does not expressly teach a mask is a wire mesh. However, Kruse teaches a mesh pattern. (Figures 6-9) It would have been obvious to one of ordinary skill in the art at the time of invention to use the mesh pattern of Kruse in order to improve bulk removal rates and pole tip recession. (See also APA, Paragraph 10) Kruse does not expressly teach a "wire" mesh. However, it is old and well known in the etching art to use metal material for exposure masks in photolithographic processes. See Balz et al. (Col. 1, Lines 14-28) It would have been obvious to one of ordinary skill in the art at the time of invention to use a metal mask in the shape of a mesh pattern and thereby provide a "wire mesh" in order to provide a mask having suitable strength for small closely spaced features.

Claims 6 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,897,424 to Evans et al. in view of "Etching in Microsystem Technology" to M. Köhler pp. 1-3,

and "Machining Fundamentals" to J. Walker pp. 511-516, and in further view of U.S. Patent 3,291,738 to Sciambi

Regarding Claims 6 and 14, Evans et al. teaches light exposure but does not expressly teach ultra-violet radiation as the light source. However it is old and well known in the photolithography art to use ultra-violet radiation to cure photoresists. For example, Sciambi teaches that conventional photoresists require ultra-violet light exposure for curing. (Col. 1, Lines 49-51) It would have been obvious to one of ordinary skill in the art at the time of invention to use ultraviolet light in order to cure a selected photoresist in the conventional manner.

Claims 7, 9, 15 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,897,424 to Evans et al. in view of "Etching in Microsystem Technology" to M. Köhler pp. 1-3, and "Machining Fundamentals" to J. Walker pp. 511-516, and in further view of "Silicon processing for the VLSI Era" to Wolf et al. pp. 407-409 and 529-530.

Regarding Claims 7 and 15, Evans et al. does not teach positive photoresist. However, Wolf et al. teaches both positive and negative photoresist types are commonly used for patterning. It would have been obvious to one of ordinary skill in the art at the time of invention to use a positive resist in order to provide high resolution capability as taught by Wolf.

Regarding Claims 9 and 17, Evans et al. does not expressly teach a wet etch operation. However the advantages of wet etching over dry etching are known in the art. It would have been obvious to one of ordinary skill in the art at the time of invention to use wet etching to perform the etching step of Evans et al. in order to benefit from high selectivity and reliability compared to dry etching as taught by Wolf.

Claims 10, 11 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,897,424 to Evans et al. in view of "Etching in Microsystem Technology" to M. Köhler, and "Machining Fundamentals" to J. Walker pp. 511-516, and in further view of U.S. Patent 4,821,461 to Holmstrand and U.S. Patent 4,037,367 to Kruse.

Regarding Claims 10 and 18, Evans et al. does not expressly teach the diamond particles have diameter less than 50 nanometers. Holmstrand teaches use of diamond particles having diameter from 1 to ten microinches. (25-254 nanometers) It would have been obvious to one of ordinary skill in the art at the time of invention to use diamond particles having diameter smaller than 50nm in order to provide suitable polishing for a magnetic head as taught by Holmstrand.

Regarding Claims 11 and 19, Evans et al does not expressly teach polishing a GMR read/write head. However, Applicant's Admitted Prior Art teaches that it is known to use a metal lapping plate such having grooves and diamond particles as shown by Kruse and Holmstrand to polish the air-bearing surface of a GMR read/write head. It would have been obvious to one of ordinary skill in the art at the time of invention to use the metal plate of Evans et al. (having etched grooves and diamond particles) to polish the air-bearing surface of a GMR read/write head.

Regarding Claim 20, since the claimed pole tip recession is a result of the claimed lapping method, and the method of Evans et al. in view of Kohler, Walker and Holmstrand teaches the same method limitations (e.g. diamond particle size), the claimed result would be similarly produced, or else arises from essential limitations not present in the claims.

(10) Response to Argument

A. 102(b) rejection of Claim 1

Applicant's only argument is that Evans does not teach etching. This is incorrect. Evans (Col. 3, Lines 57-59)

Applicant has argued that the Examiner has relied only on certain portions of Evans, namely (Col.1 Lines 10-40, Col. 3, Lines 34-46 and Col. 6, Lines 1-5) However, the argument is incorrect. The Final Rejection clearly refers additionally to (Col. 3, Lines 57-59 and Col. 4, Lines 4-6) which are not addressed or acknowledged by applicant. Note that the limitation of etching is also recited for the back surface at (Col. 4, Line 61-65) and in claims 16 and 26 of Evans. Further, Evans teaches that it is known to embed the abrasive particles in the textured substrate directly (Col. 1, Lines 10-40) or embed in a lap film (Col. 4, Lines 4-6) which reads on the broadly recited invention, since the lap film is embedded in the substrate. (See lap film description and figures)

Applicant has referred to the teaching of machining or etching the lapping plate in Evans, but "maintain there is no teaching of at least selective etching". The argument is not understood by the Examiner. Since Evans clearly teaches etching, it is assumed by the Examiner that Applicant is arguing that Evans teaches "etching" but does not teach "selective" etching. However, again, the argument is not understood, since a selective pattern is clearly described and illustrated, having peaks and valleys (resevoirs). (See Figures 2A and 2B which provide illustration). Note that selectively formed lapping plate groove patterns are also clearly illustrated in the herein cited Kruse and Holmstrand references.

B. 103(a) rejection of Claims 2-4 and 12

Applicant has argued that chemical blanking as shown in Walker is not recommended for materials thicker than 2.3 mm and would not be useful for a lapping plate. The argument is unpersuasive since Walker teaches only that the process of blanking is unsuitable for etching *completely through* metal layers thicker than 2.3 mm, (since the process is slow) however the grooves in a lapping plate are only etched to a shallow depth on the micron scale and are not etched completely through the plate and thus would be well formed by a selective etching technique using photoresist.

Applicant has argued that "Chemical blanking is not selective, etching or selective etching." However, the argument is not understood by the examiner, and is not supported by any line of reasoning. Walker expressly teaches etching after covering selected portions with a photoresist (i.e. a selective etching).

Applicant has argued that "One of ordinary skill in the art will also understand the sub-micrometer or nanometer range related teachings described in Kohler are inapplicable to a lapping plate." However, the argument is unsupported.

Applicant further argues that the thickness of the metal is extremely small in Kohler and is not suitable for a lapping plate. The argument is not persuasive since a similarly small thickness is etched to form a groove in a lapping plate. Kohler is cited to teach that photoresist is a conventional and well known masking material for selective metal etching, not to teach a lapping plate. Further, one of ordinary skill in the art would immediately recognize photoresist etching is particularly well suited to a lapping plate in which a similarly small thickness is etched.

C. 103(a) rejection of Claims 5 and 13

Applicant has argued that Kruse does not refer to at least the recited etching steps of the rejected claims. However, the alleged deficiency has been addressed above by the examiner.

D. 103(a) rejection of Claims 6 and 14

Applicant has argued that Sciambi does not refer to at least the recited etching steps of the rejected claims. However, the alleged deficiency has been addressed above by the examiner.

E. 103(a) rejection of Claims 7, 9, 15 and 17

Applicant has argued that Wolf does not refer to at least the recited etching steps of the rejected claims. However, the alleged deficiency has been addressed above by the examiner.

F. 103(a) rejection of Claims 10, 11 and 18-20

Applicant has argued that Holmstrand does not refer to at least the recited etching steps of the rejected claims. However, the alleged deficiency has been addressed above by the examiner.

Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner’s answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Roberts Culbert/

Primary Examiner, Art Unit 1792

Conferees:

/Parviz Hassanzadeh/

Supervisory Patent Examiner, Art Unit 1792

/Romulo Delmendo/

Romulo Delmendo (Date conferred: 11/27/2007)